(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 December 2004 (23.12.2004)

PCT

(10) International Publication Number
WO 2004/112204 A3

(51) International Patent Classification[7]: H01S 3/06, 3/063

(21) International Application Number:
PCT/DK2004/000395

(22) International Filing Date: 10 June 2004 (10.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PA 2003 00874 12 June 2003 (12.06.2003) DK
60/477,791 12 June 2003 (12.06.2003) US

(71) Applicant (*for all designated States except US*): DANMARKS TEKNISKE UNIVERSITET [DK/DK]; Ledelsessekretariatet, DTU, Bygning 101 A, DK-2800 Kgs. Lyngby (DK).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): KRAGH, Søren [DK/DK]; Ryesgade 1, 5.th., DK-2200 Copenhagen N (DK). KRISTENSEN, Anders [DK/DK]; Lyngbyvej 32A, 9. tv, DK-2100 Copenhagen Ø (DK). MENON, Aric [US/DK]; Strandparksvej 10, st.tv, DK-2900 Hellerup (DK).

(74) Agent: PLOUGMANN & VINGTOFT; Sundkrogsgade 9, P.O. Box 831, DK-2100 Copenhagen Ø (DK).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

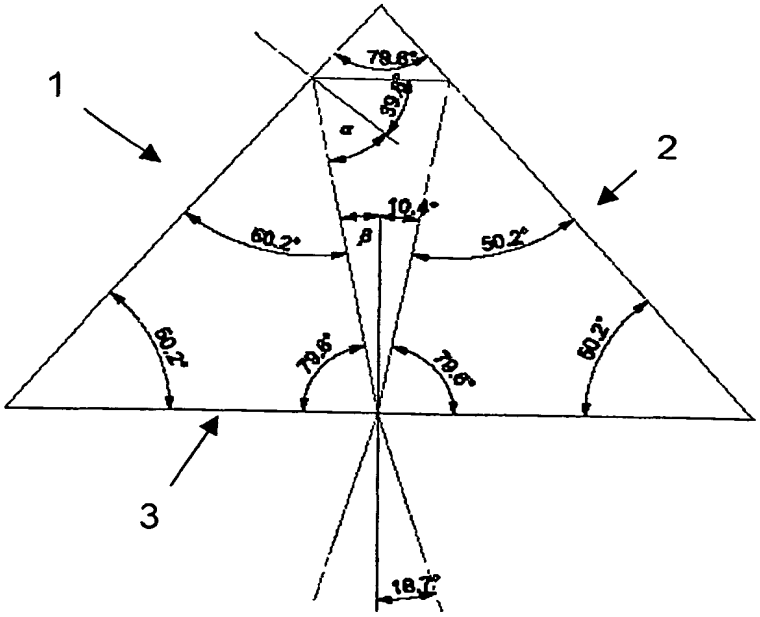
(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
10 March 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OPTICAL AMPLIFICATION IN MINIATURIZED POLYMER CAVITY RESONATORS



(57) Abstract: An optical device for providing optical amplification comprises a substrate, a radiation sensitive polymer structure provided on the substrate in a shape defined by a number of sidewalls, n, and being doped with an optically active medium, wherein the sidewalls of the structure form a cavity resonator so that an electromagnetic wave upon pumping of the device is emitted laterally. The radiation sensitive polymer may be a photo-definable polymer, such as SU-8. The optical device for providing optical amplification may also comprise a substrate and a photo-definable polymer structure provided and being doped with an optically active medium. The device may have a shape and/or at least one material provided at least along a part of at least one sidewall of the structure so that a beam propagating in the structure will experience total internal reflection when incident on no more than n-1 sidewalls.

WO 2004/112204 A3

560,093

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 December 2004 (23.12.2004)

PCT

(10) International Publication Number
WO 2004/112204 A2

(51) International Patent Classification[7]: H01S 3/00

(21) International Application Number:
PCT/DK2004/000395

(22) International Filing Date: 10 June 2004 (10.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PA 2003 00874 12 June 2003 (12.06.2003) DK
60/477,791 12 June 2003 (12.06.2003) US

(71) Applicant *(for all designated States except US)*: **DANMARKS TEKNISKE UNIVERSITET** [DK/DK]; Ledelsessekretariatet, DTU, Bygning 101 A, DK-2800 Kgs. Lyngby (DK).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KRAGH, Søren** [DK/DK]; Ryesgade 1, 5.th., DK-2200 Copenhagen N (DK). **KRISTENSEN, Anders** [DK/DK]; Lyngbyvej 32A, 9. tv, DK-2100 Copenhagen Ø (DK). **MENON, Aric** [US/DK]; Strandparksvej 10, st.tv, DK-2900 Hellerup (DK).

(74) Agent: **PLOUGMANN & VINGTOFT**; Sundkrogsgade 9, P.O. Box 831, DK-2100 Copenhagen Ø (DK).

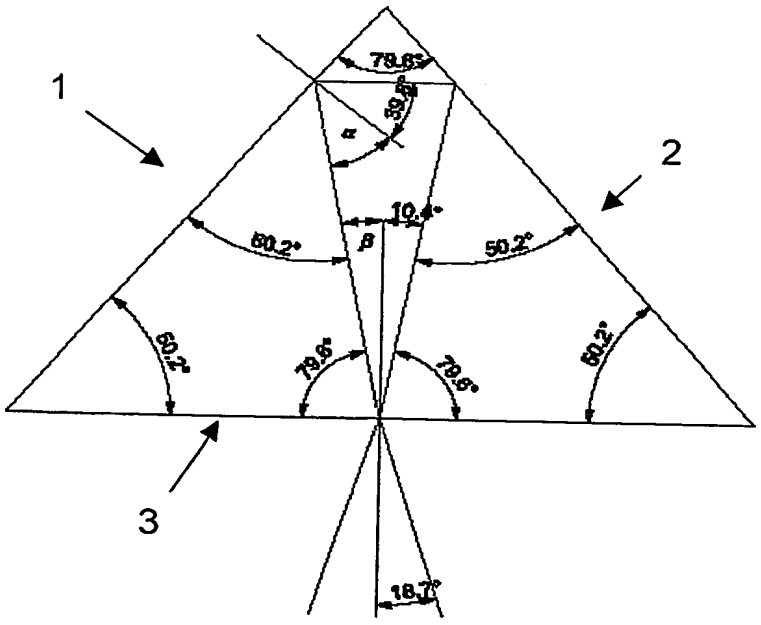
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OPTICAL AMPLIFICATION IN MINIATURIZED POLYMER CAVITY RESONATORS



(57) Abstract: An optical device for providing optical amplification comprises a substrate, a radiation sensitive polymer structure provided on the substrate in a shape defined by a number of sidewalls, n, and being doped with an optically active medium, wherein the sidewalls of the structure form a cavity resonator so that an electromagnetic wave upon pumping of the device is emitted laterally. The radiation sensitive polymer may be a photo-definable polymer, such as SU-8. The optical device for providing optical amplification may also comprise a substrate and a photo-definable polymer structure provided and being doped with an optically active medium. The device may have a shape and/or at least one material provided at least along a part of at least one sidewall of the structure so that a beam propagating in the structure will experience total internal reflection when incident on no more than n-1 sidewalls.

WO 2004/112204 A2